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## AN ENGINEER'S POINT OF VIEW

HILLHOUSE BUEL

Industrial Engineer

THE subject of railroads is possibly as interesting as any subject that we have to deal with, because it is one of the three major divisions of our activities, namely, production, distribution and consumption. It, therefore, enters into all the factors of our lives.

### *Government Operation*

I have been interested in following the different bills that have been presented in Congress, and the different comments that have been made upon them. The remarks in regard to the Plumb Plan bring out the question of government ownership or control.

I would like to say just briefly that government ownership, operation or control, while it might operate satisfactorily in an autocracy, if your autocrat were wise, will not work out satisfactorily in a democracy such as we have to-day. Although we may change our democracy in the future, under our present form of democracy, we would find that government ownership would impose upon us a paternalism which would destroy incentive, paralyze initiative, and retard progress.

In the second place, the officers would be appointed, not for their experience and ability, but on account of their influence and usefulness to the prevailing party. This could only lead to inefficiency. It is not the way we solve economic problems.

### *Faulty Organization*

Recently we have had an illustration of improper organization at Washington in the National Industrial Conference. To start with, the conference was improperly composed. The men were not selected on account of their special fitness to solve economic problems. Secondly, the conference was improperly organized and its methods of procedure were opposed to economic law. It was organized into two or three conflicting groups that were to oppose each other and to arrive at their conclusions by arbitrary determinations, compromise, barter or the numerical ponderance of a mere vote.

### *Solving Economic Problems*

Now, economic problems are not solved by guess work, and they are not solved by a mere vote. If you want to know how many peas there are in a pod, you do not call a conference and take a vote on it. Economic problems should be solved by accurate and thorough observation as a basis for exact and scientific determinations. When you constitute these different bodies that are to solve your economic problems with properly chosen engineers—transportation engineers, industrial engineers, and production engineers, managers who have had successful experience in the operation of their different activities, and your various operatives that cover the successful operations in your different departments—when you have brought together a body or staff of such material, you will have a fair chance first, to see that the situation is properly observed as a prerequisite for your future determinations, and second, that you have the men qualified to make the careful, exact determinations necessary for sane, workable, economic operations of the transportation units.

### *A Comparison*

To the gentlemen who stated that "we are the only country in the world that does not own its own roads," I wish to answer first, that his statement is a bit broad, and second, that a comparison of the growth and development of our railroads and our country with the other countries of the world would seem to commend our system over all others. I sincerely trust we will have the good sense not to destroy or impair that incentive which, in a brief one hundred years, has made us in production and progress the giant and premier country of the world."

Much has been said in support of consolidating and regrouping the railroads under a board, something of zoning by public officials, and much more about the expenditure of capital, the equalization of revenues with the contingent fund and refinancing. To these issues I want to reply briefly.

### *Wise and Unwise Consolidations*

It has been my experience that consolidations are commonly effected, wittingly or unwittingly, with total disregard of what functions can or cannot be consolidated with good results. The provisions advocated and those embodied in bills now pending or heretofore submitted to Congress if enacted or made effective would ultimately disorganize and greatly impair the entire trans-

# Proposed Plans for A Summary by

Secretary, Railroad Committee Chamber

THE Chamber of Commerce of the United States has prepared the accompanying chart to show in convenient form for comparison by busy men seven proposed plans for railroad legislation. In all probability one of these plans will be enacted into law before the

President returns the railroads to their owners on January first.

The Transportation Conference plan is proposed by the National Transportation Conference which was held under the auspices of the Chamber of Commerce of the

|                                          | Senate Committee Plan                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Commerce Co. mission Plan.                                                                                                                                                                                                                                                                                                                                                                                                      | Railway Executives Plan                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                          | The Cummins Bill S-2906 presents the recommendations of the sub-committee of the Senate Committee on Interstate Commerce. It provides for:—                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | The Esch-Pomerene Bill H. R. 4378 presents the plan proposed by the Interstate Commerce Commission. It provides for:—                                                                                                                                                                                                                                                                                                           | The tentative draft of a bill laid before the House Committee by T. D. Cuyler, President of the Association of Railway Executives, provides for:—                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Ownership and Operation                  | Ownership and operation of all the railroads in the United States by 20 to 35 separate competing systems.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Ownership and operation of all railroads by private corporations under broad federal supervision.                                                                                                                                                                                                                                                                                                                               | Ownership and operation of all railroads by private corporations under a broad national control and a unified system of government regulation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Consolidation and Competition            | Consolidation of all railroad properties into 20 to 35 systems in accordance with a plan previously adopted by the Railway Transportation Board and approved by the Interstate Commerce Commission—consolidation to be voluntary if accomplished within seven years, and if not, compulsory.                                                                                                                                                                                                                                                                                                                                                                 | Consolidation of existing railroad systems when approved by the Interstate Commerce Commission.                                                                                                                                                                                                                                                                                                                                 | Consolidation of existing lines into strong competitive systems wherever found to be in the public interest; and also provision for joint use of terminals when in the public interest.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Federal Incorporation                    | Federal incorporation of all railroads with a requirement that each corporation shall include in its Board of Directors two representatives of classified employees and two representatives of the government.                                                                                                                                                                                                                                                                                                                                                                                                                                               | Opposition to federal incorporation as a complicated, protracted and probably unconstitutional method.                                                                                                                                                                                                                                                                                                                          | Provision for permissive federal incorporation of all interstate carriers.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Security Issues and Capital Expenditures | Exclusive regulation and control by the Interstate Commerce Commission of the issuance of railway stocks and bonds and of the purposes to which the proceeds thereof may be applied.                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Full control by the Interstate Commerce Commission over stock and bond issues and over the expenditure of the proceeds.                                                                                                                                                                                                                                                                                                         | Exclusive national control of the issue of securities and the expenditure of new capital—this control to be exercised by the Federal Transportation Board.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Adequate Revenues                        | Initiation of rates by carriers subject to the approval of the Interstate Commerce Commission. Requirement that the Interstate Commerce Commission shall divide the country into rate districts and the carriers into rate groups for rate making purposes. Regulation of all rates that affect interstate commerce by the Interstate Commerce Commission under a statutory rule providing that in making rates for the several rate groups the Commission shall take into consideration the interest of the public, the shipper, the wages of labor, the cost of maintenance and operation, including taxes and a fair return on the value of the property. | Regulation of rates by the Interstate Commerce Commission under the provisions of the Act to Regulate Commerce with amendments shortening the period of suspension of rates, authorizing the Commission to determine the division of rates between carriers, to consider the cost of service principle in fixing rates, and to exercise other broad powers affecting the general rate structure.                                | Initiation of rates by the carriers. Exclusive regulation of rates by the Interstate Commerce Commission with the aid of Regional Sub-commissions under a statutory rule prescribing that the level of rates shall provide revenue sufficient to pay wages and other expenses of operation and a fair return on the value of the property used in the public service and to establish and maintain a credit sufficient to attract the new capital necessary to meet the public need for transportation facilities. Certification by the Federal Transportation Board to the Interstate Commerce Commission of the amount of operating revenues needed by the carriers to enable them to perform their functions. |
| Wages and Working Conditions             | Creation of a committee of wages and working conditions (four employees and four representatives of the companies) to settle disputes; with appeal to the Transportation Board in case of deadlock. Declaration that decisions of the Board, i. e., of the Government, shall be final and that railroad strikes and lockouts are forbidden.                                                                                                                                                                                                                                                                                                                  | (No declaration.)                                                                                                                                                                                                                                                                                                                                                                                                               | (No declaration.)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Federal Agencies of Regulation           | Continuance of the Interstate Commerce Commission with enlarged powers to regulate rates and security issues. Creation of a Railway Transportation Board with five members appointed by the President to perform many important executive and administrative functions, including some now performed by the Interstate Commerce Commission.                                                                                                                                                                                                                                                                                                                  | Maintenance of the Interstate Commerce Commission with all of its present powers and in addition authority: to regulate carriers by water; to control consolidations, joint use of facilities and the pooling of freight earnings; to authorize additions, extensions, and the construction of new lines; to adjust conflicts between federal and state jurisdictions; and to control security issues and capital expenditures. | Maintenance of the Interstate Commerce Commission with authority to regulate rates and to continue its present valuation and accounting functions. Creation of a Federal Transportation Board composed of three Commissioners appointed by the President and charged with the general oversight from the point of view of the public interest of all transportation. This board would be co-ordinate with the Interstate Commerce Commission and would relieve it of all functions except rate regulation, valuation and accounting.                                                                                                                                                                             |

# Railroad Legislation

**Richard Waterman**

of Commerce the United States

United States, and included in its membership prominent men belonging to every important interest affected by transportation—commercial, industrial, agricultural, financial, labor, governmental, economic, civic and social. The fundamental features of this plan, printed below in

black-face type, have been approved by a referendum vote of the business men of the country. Certain additional features of the Conference plan, printed below in light-face type, are in harmony with the remainder of the plan, but have not yet been submitted to a referendum vote

| Transportation Conference                                                                                                                                                                                                                                                                                                                                                                       | Warfield Plan                                                                                                                                                                                                                                                                                                                                                                                                                | Amster Plan                                                                                                                                                                                                                                                                                                                                                                                                        | Plumb Plan                                                                                                                                                                                                                                                                                                                                |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The Frelinghuysen Bill S. 2398 presents the plan proposed by the National Transportation Conference held by the U. S. Chamber of Commerce—                                                                                                                                                                                                                                                      | The tentative draft of a bill laid before the House Committee by S. Davies Warfield, President of the National Association of Owners of Railroad Securities—                                                                                                                                                                                                                                                                 | The Lenroot Bill S. 2389 presents the plan proposed by Nathan L. Amster, President of the Citizens National Railroads League. It provides for—                                                                                                                                                                                                                                                                     | The Sims Bill H. R. 8157 presents the plan proposed by Glenn E. Plumb, and endorsed by the Railroad Brotherhoods. It provides for—                                                                                                                                                                                                        |
| Ownership and operation of all of the railroads in the United States by federal corporations under a comprehensive system of Government regulation.                                                                                                                                                                                                                                             | Ownership and operation of all of the railroads of the country by the existing railroad companies.                                                                                                                                                                                                                                                                                                                           | Ownership and operation of all railroads by one privately owned and privately operated railroad company with full public control.                                                                                                                                                                                                                                                                                  | Ownership of all railroads by the United States Government. Operation of all railroads as a single system by a corporation composed of railroad employees.                                                                                                                                                                                |
| Consolidation of existing railroads into strong competitive systems under conditions prescribed by the Federal Transportation Board; with provision that if after five years the consolidations planned by the Board are not well advanced, the Board may require their completion.                                                                                                             | Permission to consolidate existing railroads when found by the Interstate Commerce Commission to be compatible with the public interest.                                                                                                                                                                                                                                                                                     | Complete consolidation of all railroad companies into a single national corporation thus putting an end to competition.                                                                                                                                                                                                                                                                                            | Consolidation of all of the railroads into a single national system; and elimination of all competition.                                                                                                                                                                                                                                  |
| Federal Incorporation of all existing railroad companies and of all existing consolidated companies with a requirement that each railroad company shall be managed by a board of directors, of which 12 directors, of whom 5 shall be elected to represent the stockholders, and 2 to represent the employees and 2 to represent the principal interests in the territory served by the system. | Opposition to federal incorporation on the ground that it is unnecessary, is probably unconstitutional and would involve endless litigation.                                                                                                                                                                                                                                                                                 | Federal Incorporation of the National Railway Corporation with a board of eleven directors, including one director representing the Interstate Commerce Commission, one the State Commissioners, two the employees, two commerce and industry, two farmers and three the stockholders.                                                                                                                             | Federal incorporation of the National Railway Operating Corporation for a term of 100 years with a board of directors—5 named by the President, 5 elected by the operating officials for railroad purposes by the classified railroad employees.                                                                                          |
| Exclusive federal regulation of the capital expenditures and the security issues of all railroads engaged in interstate commerce.                                                                                                                                                                                                                                                               | Supervision by the Interstate Commerce Commission (in conjunction with the six Regional Commerce Commissions), over issue and sale of securities and over the expenditure of proceeds.                                                                                                                                                                                                                                       | Complete supervision by the Interstate Commerce Commission of the issuance of all securities and the expenditure of the proceeds.                                                                                                                                                                                                                                                                                  | Issue of all railroad securities by the United States Government. Expenditures of all capital funds for railroad purposes by the United States Government.                                                                                                                                                                                |
| Initiation of rates by the carriers subject to the review of the Interstate Commerce Commission.                                                                                                                                                                                                                                                                                                | Initiation of rates by the carriers, and consideration of proposed changes in rates before the schedules are filed with the Commerce Commission) by rate committees composed of representatives of the railroads and the shippers.                                                                                                                                                                                           | Initiation of all rates by the Corporation. Regulation of rates by the Interstate Commerce Commission under a statutory rule providing that rates shall be at least adequate to produce revenues sufficient to pay all proper operating expenses and fixed charges, to pay maximum dividends on all outstanding stock and in addition to produce a sum not exceeding 2% of the par value of all outstanding stock. | Initiation of all rates by the National Railway Operating Corporation. Regulation of all rates by the Interstate Commerce Commission.                                                                                                                                                                                                     |
| Adjustment of all rates that affect interstate commerce by the Interstate Commerce Commission under a statutory rule providing that the rate structure shall be designed to yield a net return of 6% on the aggregate fair value of the roads in each traffic section of the country.                                                                                                           | Maintenance of a general rate level by the Interstate Commerce Commission under a statutory rule prescribing that rates shall as nearly as possible produce not less than 6% on the aggregate property investment account of the railroads grouped in each of the three classification territories; each railroad receiving as much of the 6% as its efficiency in operation may secure for it under competitive conditions. | Government guarantee of a 4% dividend on all stock issued by the Corporation; payment of a maximum dividend of 6% when earned; and distribution of all earnings in excess of 6%—40% to labor, 30% to the public for improvements and retiring outstanding stock and 30% to the stockholders.                                                                                                                       | Distribution of surplus earnings (if any) after operating expenses are paid and fixed charges are met, including the interest on outstanding government securities— $\frac{1}{2}$ to the government and $\frac{1}{2}$ to the railroad employees.                                                                                          |
| Creation of an individual contingent fund by each road to support its own credit and of a general contingent fund maintained by contributions from all prosperous roads to support the credit of all railroads.                                                                                                                                                                                 | Distribution of the excess earnings of each road, $\frac{1}{3}$ to the road and $\frac{2}{3}$ to be divided equally between labor and the public.                                                                                                                                                                                                                                                                            | Appointment from time to time of advisory boards composed of equal numbers of representatives of the employees and of the Corporation to investigate demands relating to wages, hours of labor or working conditions and publish their findings and recommendations which, however, shall not be binding on either side.                                                                                           | Determination of wages by the Board of Directors of the Corporation. Adjustment of disputes between officials and men by boards to which the operating officials elect 5 members and the men 5 members; with appeal to the Director in case the Board fails to reach an adjustment.                                                       |
| Adjustment of wages, hours of labor and other conditions of service of employees by boards composed of equal numbers of representatives of employees and officers of the railroads, with appeal in case of a dispute to the Federal Transportation Board as referee.                                                                                                                            | Authorization of each Regional Commission to act as a Board of Conciliation or Arbitration in all disputes between the carriers and the employees in its respective territory, subject to review by the Interstate Commerce Commission.                                                                                                                                                                                      | Maintenance of the Interstate Commerce Commission with all of its present powers and in addition authority to regulate security issues and capital expenditures and to exercise other broad regulatory functions.                                                                                                                                                                                                  | Maintenance of the Interstate Commerce Commission with its present rate-making powers.                                                                                                                                                                                                                                                    |
| Maintenance of the Interstate Commerce Commission with all of its present powers and with certain additional powers over rates.                                                                                                                                                                                                                                                                 | Continuation of the Interstate Commerce Commission to control and regulate rates, adjust wages and perform other regulatory functions belonging to the federal government.                                                                                                                                                                                                                                                   | Creation of six Regional Commerce Commissions to exercise concurrent jurisdiction with the Interstate Commerce Commission.                                                                                                                                                                                                                                                                                         | Creation of the Railway Board of Appraisal and Extension composed of the nine Interstate Commerce Commissioners and three other members selected by the Directors of the Corporation to determine the amount of compensation to be paid to the present owners of the roads and the amount to be paid for new extensions and improvements. |
| Creation of a Federal Transportation Board of five members appointed by the President to promote the development of a unified system of rail, water and highway transportation; to inquire into and propose measures for preventing abuses therein, to pass upon the public necessity for capital expenditures and to regulate security issues.                                                 | Formation of the National Railroads Association, a corporation managed by nine Interstate Commerce Commissioners and eight representatives of the railroads to furnish a great clearing house for railroad operation.                                                                                                                                                                                                        | Formation of the National Railroads Association, a corporation managed by nine Interstate Commerce Commissioners and eight representatives of the railroads to furnish a great clearing house for railroad operation.                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                           |

portation system, would greatly retard and impede industry and commerce and only result in heavy loss to the whole country.

Our experience during the war with uneconomic overconsolidations and over-centralizations attempted without a proper knowledge of the fundamental principles of economic organization and distribution of functions, should cause us to pause before we plunge headlong into other top-heavy consolidations, which are not, as a prerequisite, squarely founded on scientific economic determinations of all factors involved. We have seen war organizations that worked well in large cities break down with costly results when applied by the same officials to the country as a whole, because they did not understand the fundamental principles of organization and economic adjustment of functions. Consolidations should be limited to normal extensions and combinations which have an economic value, preserving all proper economic competitive factors. A contrary course would prove most costly and unwise.

#### *Economic Co-ordination*

It is, however, vitally essential that the transportation units of the country be properly *co-ordinated*. By this is meant *not* the consolidation of all the roads, but the relating of the several units so that they will function to the common advantage while preserving their individual identity and several operation. So related, they would avoid destructive competition while stimulating a wholesome competitive rivalry, encouraging genius and effective economics, and furthering development and progress. Properly adapted and applied this would result in direct benefit and profit to the roads, to the employees and to the entire industrial and commercial interests of the country. This can be done.

#### *Rates*

The statement that "the correct solution of rates is to have them made by public officials" is unsound and ill advised. Shoes should be made by shoemakers and rail rates by rail rate-makers experienced in railroading. Nor should they be arrived at by compromise, barter or the mere ponderance of a vote. The Governmental administrative body, with examiner and public service functions, should have one or two experienced rail rate men in its body and should see that the making and administration of rates conform with the law. The statutes should be expressed in terms of principles, limitations and self-

determinate ratios and worded so as to preadvise the roads what their obligations and duties are. The provisions for the public service functions of the administrative body should grant authority to meet situations, emergencies and needs which the statutes fail to cover.

### *Distribution of Revenues*

Much has been said in approval of the contingent fund plan and the equalization of revenues as expressed in Section 6 of Senate Bill 3288. I am obliged to take issue with the proponents of these provisions. Of all the pending legislation, if enacted and enforced, this section, which proposes to distribute certain earnings of profitable roads to the unprofitable roads, would in time only wreck the transportation system of the country and cripple industry and commerce. Roads now efficient would become inefficient and inefficient roads only less efficient. The section as it now stands fatally violates all economic law. It, in fact, provides a system of *forcing accounts* to meet deficits—but another sample of *super-accounting* for self and public deception. It is economic error to penalize efficiency or to put a premium on inefficiency. Experience teaches that what does not conform to economic law cannot endure. This is axiomatic.

### *Economic Solutions*

There is a solution to this problem and this section of the Senate bill *can* be amended to conform to the law.

*First.* It should provide for a standard wage scale, cost of operation, rates and dividends in limitation of ratios and percentums as a result of an exhaustive engineering survey.

*Second.* It should provide a margin in rates to meet fluctuations, the balance resulting going to the Government as a tax and thus finally returning to the consumer.

*Third.* It should provide that any savings or increased balances resulting from any efficiencies or economies that shall be effected shall be distributed one-third to the shareholders in the form of increase to dividends; one-third to the employees and management, effecting the saving and one-third to the Government on earned sums until such time as it can be applied in a permanent reduction of rates. By thus preserving proper incentive for greater effort and efficiency, substantial economies will be encouraged and inventive genius stimulated. This is good business.

*Plans to Refinance*

It has been stated here by a gentleman who stands high in financial circles that "the \$6,000,000,000 needed to refinance the railroads of the country cannot be raised by any conceivable plan." In taking issue with the speaker, I wish to state that I might refer him to half a dozen or more gentlemen who can provide a suitable plan for this accomplishment and that my own work on this problem some months ago crystallized in the concrete form of an outline and chart, which I am able to state is well adapted effectively to finance the railroads on a safe and sound basis and impart a high standard of security to their paper.

*Arbitration*

The provision in pending legislation looking to make arbitration compulsory is both amusing and unwise. Unwise because it will not work. Amusing because it is just the opposite from what it should be. The act should specifically provide that no rates, no wage scales, no time schedules and no operating factors shall be or become a subject for arbitration or bargaining. That these elements shall be fixed only as the result of **exact**, scientific determinations of accurate and thorough surveys made by a competent staff of engineers constituted for that purpose. It is time we removed the solution of these problems from the realm of guess work, bargaining, barter and compromise. When we do so, all individuals and groups concerned will profit most greatly.

*Present Needs*

What the railroads need is not copious legislation and multiplicity of boards, but rather the enactment of a few simple measures and some good straight work by those who will untie their knots and map out the working details of plans that will carry into effective operation the proper relating of their several activities.

*Conclusions*

In conclusion I wish to urge that the pending bills and legislation be amended before enactment in line with these suggestions,—and that steps be taken by those in a position to act, to form and provide for a staff of engineers and experienced railroad men who shall take up the solution of these problems and work out detailed plans to carry solutions into effective operation.